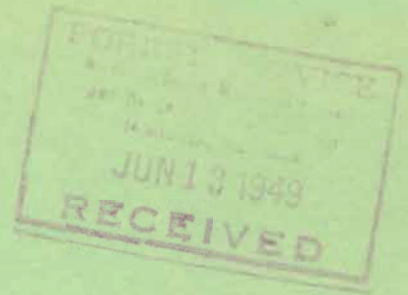


Central File
No. 0.73



FOREST STATISTICS
FOR SOUTHERN NEW HAMPSHIRE

*Northeastern
Forest Experiment Station
Upper Darby, Pa.
V.L. Harper, Director*



This is the fifth in a series of Forest Survey statistical releases to be published by the Northeastern Forest Experiment Station. The prior releases in this series are:

- No. 1 - Forest Resources of Elk, Forest, McKean, and Warren Counties, Pennsylvania
- No. 2 - Forest Statistics for Pendleton, Pocahontas, and Randolph Counties, West Virginia
- No. 3 - Forest Statistics for Northern New Hampshire
- No. 4 - Forest Statistics for Hancock County, Maine

FOREWORD

This release presents statistics on forest area and timber volumes for Belknap, Cheshire, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties, New Hampshire. Eight statistical tables of forest area and sixteen on timber volumes are included. These tables are followed by a brief description of Forest Survey procedure and estimates of the accuracy of forest area and timber volume figures. Because many of the terms used in this release have special meanings, an explanation of the terms used may be found at the end of the report.

This report was prepared by the Forest Survey organization at the Northeastern Forest Experiment Station under the direction of Frank A. Ineson, assisted by Harry W. Camp, Jr., in charge of inventory; Roland H. Ferguson, in charge of compilations; and George B. P. Mullin, field supervisor. Field inventory work in southern New Hampshire was completed in March 1948. Supplemental surveys to obtain data for volume tables and a forest land ownership study were completed in November 1948. Field work was conducted primarily by A. P. Caporaso, A. M. Gilbert, T. J. Grisez, J. J. Mendel, R. B. Pope, T. Richards, and J. H. Zerbe.

This report on forest area and timber volume statistics together with Forest Survey Release No. 3, completes those planned for counties or county groups in New Hampshire. These will be followed by a statistical report for the State as a whole, which will include timber growth and drain estimates as well as forest area and timber volume data. Later, a comprehensive report analyzing the current and prospective forest situation for the State will be published.

The Forest Survey is conducted in the various forest regions by the forest experiment stations of the Forest Service. The project in the Northeast is directed by the Northeastern Forest Experiment Station with central headquarters in Upper Darby, Pennsylvania.

The Station wishes to express its appreciation for the aerial photographs provided by the State of New Hampshire Forestry and Recreation Commission and for the cooperation of many individuals and agencies in New Hampshire in facilitating the forest survey.

Kemp RR
Hutchinson
Young B. M.
Powell W. R.
Brown
Hodge

CONTENTS

	<u>Page</u>
Salient statistics	1
Table 1 - Commercial and noncommercial forest area by county group, 1948	5
Table 2 - Forest and nonforest area by county, 1948	6
Table 3 - Commercial forest area by ownership class and county group, 1948	7
Table 4 - Commercial forest area by forest type and county group, 1948	8
Table 5 - Commercial forest area by county group, forest type group, and stand-size class, 1948	9
Table 6 - Commercial forest area by forest type group and stand-size class, 1948	10
Table 7 - Commercial forest area by forest type group and site class, 1948	11
Table 8 - Commercial forest area by watersheds and stand-size class, 1948	12
Table 9 - Net board-foot volume on commercial forest land by forest type group, stand-size class, and species group, 1948	13
Table 10 - Average net board-foot volume per acre on commercial forest land by forest type group, stand-size class, and species group, 1948	14
Table 11 - Net volume in cords of sawlog material on commercial forest land by forest type group, stand-size class, and species group, 1948	15
Table 12 - Average number of cords per acre of sawlog material on commercial forest land by forest type group, stand-size class, and species group, 1948	16
Table 13 - Net volume in cords of material other than sawlog on commercial forest land by forest type group, stand-size class, and species group, 1948	17

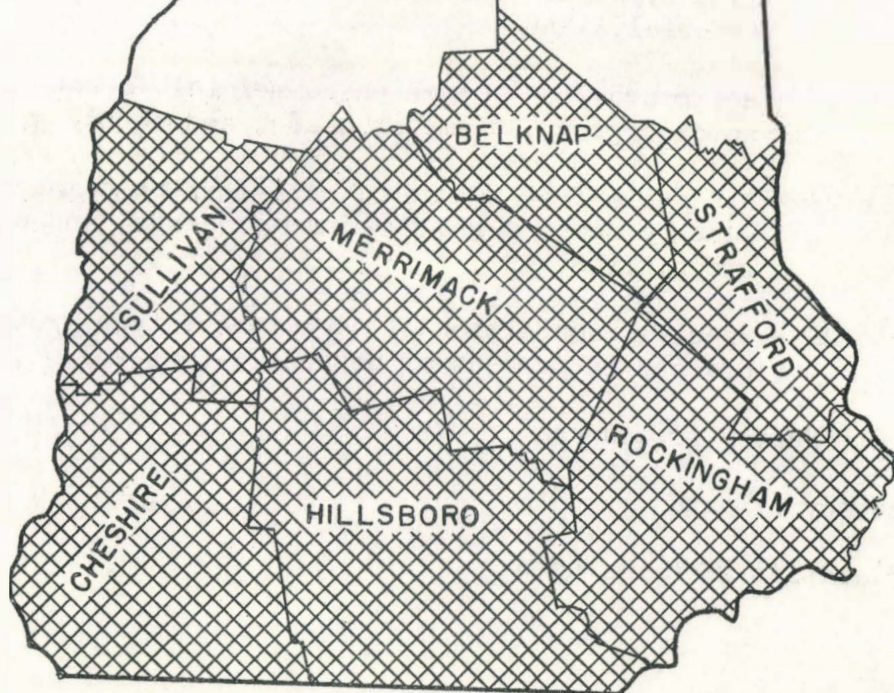
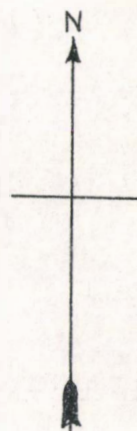
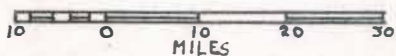
CONTENTS (continued)

	<u>Page</u>
Table 14 - Average number of cords per acre of material other than sawlog on commercial forest land by forest type group, stand-size class, and species group, 1948	18
Table 15 - Net board-foot volume on commercial forest land by species and stand-size class, 1948	19
Table 16 - Net volume in cords of all trees on commercial forest land by species and stand-size class, 1948	20
Table 17 - Net board-foot volume on commercial forest land by species and county group, 1948	21
Table 18 - Net volume in cords of all trees on commercial forest land by species and county group, 1948	22
Table 19 - Net cubic-foot volume of all trees on commercial forest land by species, tree class, and kind of material, 1948	23
Table 20 - Net volume in cords of all trees on commercial forest land by species, tree class, and kind of material, 1948	24
Table 21 - Net volume in cords of all trees on commercial forest land by stand-size class, tree class, and kind of material, 1948	25
Table 22 - Net board-foot volume on commercial forest land by species group, diameter class, and county group, 1948	26
Table 23 - Net cubic-foot volume of all trees on commercial forest land by species group, diameter class, and county group, 1948	27
Table 24 - Species composition of each forest type group, expressed in percent of net cubic-foot volume, 1948	28
Forest Survey procedure	29
Accuracy of data	29
Explanation of terms used	31

NEW HAMPSHIRE



Counties covered
by this report



FOREST STATISTICS FOR SOUTHERN NEW HAMPSHIRE

compiled by

Forest Survey Staff
Northeastern Forest Experiment Station

SALIENT STATISTICS

The seven counties in southern New Hampshire covered by this report have a gross land area of 2,908,200 acres, of which 2,325,200 acres or 80 percent is forest land.

There are 15,800 acres of nonproductive forest land and an additional 3,200 acres of productive forest land that has been withdrawn from commercial timber production. The latter includes the U. S. Army's New Boston bombing range, State forest parks, and a few municipal watersheds. The remaining 2,306,200 acres are classified as commercial forest land.

The topography of southern New Hampshire varies from the relatively flat sandy seacoast region to rocky and rough upland areas that reach an elevation of 3,165 feet on the summit of Mt. Monadnock. The seacoast region is drained by several streams flowing into the Atlantic Ocean. The elevations in this section range up to 300 feet above sea level. The Connecticut and Merrimack Rivers drain the remainder of the area. The valleys of these two rivers are fertile, and are characterized by gentle to moderate topography. The area between the main valleys is higher and more rugged, with thinner soils at elevations ranging from 1,500 feet to about 3,000 feet above sea level. The lakes region is drained by tributaries of the Merrimack River and has a general range in elevation from 500 to 1,000 feet, with a few mountains reaching over 2,000 feet. This area is noted for its numerous clear fresh-water lakes, the largest of which is Lake Winnepesaukee.

Settlement along the New Hampshire coast began about 1623 and was centered around the lower reaches of the Piscataqua River. The population has been estimated at about 500 in 1630, and it did not exceed 10,000 until some time after 1720. The period 1720 to 1750 was marked by an increase in population to about 31,000. During this period settlements were extended through the Merrimack and Connecticut valleys. By 1790 most of the southern half of the State had been settled and the population had increased to approximately 142,000. In 1940, there were about 392,000 people

in the southern half of the State, representing approximately 80 percent of the total State population. The transportation system has grown with the increasing population and at the present time the entire area is covered by good highway and rail transportation systems.

The principal groups of industry are textiles, boots and shoes, lumber and wood products, steel, printing and publishing, toys, furniture, and upholstery. The most important agricultural areas are in the Connecticut and Merrimack valleys, with successful dairy farming extending into the upland areas adjacent to these drainages. Southern New Hampshire provides a variety of recreational facilities, including seashore resorts, lakes, and mountain areas. Fishing, hunting, and skiing are seasonally important. Its accessibility to the cities of the Northeast has resulted in heavy use for recreation.

Forest land ownership.--The forest land in southern New Hampshire is in relatively small ownerships. There are very few individuals or corporations who own more than 5,000 acres. This is in direct contrast to conditions in northern New Hampshire, where large ownerships are common. There are 69,800 acres of publicly owned commercial forest land, about 93 percent of which is in State, county, and municipal ownership. The 2,236,400 acres of privately owned commercial forest land contains 792,300 acres of farm woodland and 1,444,100 acres in industrial and other types of private ownership.

Forest type groups.--The forest types of southern New Hampshire have been combined into four principal forest type groups, namely, white pine, spruce-fir, aspen-paper birch, and hardwood. The white pine types are found throughout southern New Hampshire and occupy approximately 45 percent of the commercial forest land. A considerable area of hemlock but relatively small areas of pitch pine and of red pine are included in this type group. Associated hardwood species are principally red maple, red oak, and paper birch. Under heavy cutting on the productive loamy soils these types have a tendency to revert to hardwoods.

The hardwood types cover about 43 percent of the commercial forest land area and are made up primarily of northern hardwood, ash-maple-elm, and oak types. The principal species are red maple, red oak, and sugar maple. In some stands, white pine and hemlock are mixed with the oaks or northern hardwoods. This type group is second in importance in southern New Hampshire and is found generally intermingled with the white pine types throughout the area.

The aspen-paper birch type group covers about 8 percent of the commercial forest land area and includes pure stands of aspen or paper birch, primarily the latter. These are the so-called temporary types, ordinarily resulting from clear-cuttings or forest fires. The principal associate species are white pine, red oak, and red maple.

The spruce-fir types cover only 4 percent of the commercial forest land area of southern New Hampshire. In the original forest cover these types were more prominent. They are found mainly in the upland area of Sullivan and northern Cheshire Counties. Red spruce is the principal species, with a relatively small proportion of balsam fir. Red maple, white pine, and hemlock are associated with them in this section of the State.

The productive capacity of the forest soils is expressed by relating one site quality to another. Approximately 81 percent of the commercial forest land is capable, at the present time, of producing hardwood saw-timber trees containing one and one-half to three 16-foot logs or softwood saw-timber trees containing three to five 16-foot logs. Less than 1 percent of the area is classified as more productive than this; the remainder as less productive but capable of producing trees with at least one 8-foot merchantable log.

Stand-size classes.--During the settlement of southern New Hampshire a large proportion of the forest was cleared. With the extensive abandonment of cultivated and pastured land during the 19th century, forests of white pine and hardwood again claimed most of the land. These forests have been subjected to repeated cuttings, many of which have been on relatively small areas, resulting in extremely variable forest conditions.

The saw-timber stands, containing 1,500 board feet or more per acre and averaging 4,330 board feet, make up about 33 percent of the commercial forest land. Most of the saw-timber stands range from 1,500 board feet to 5,000 board feet and average about 3,040 board feet per acre.

The pole-timber stands cover 36 percent of the commercial forest land and have volumes ranging from $2\frac{1}{2}$ cords to more than 17 cords per acre. They contain an average of about 1.4 cords of sawlog-size material and 9.8 cords of other material per acre.

The remaining 31 percent of the commercial forest land is made up of seedling and sapling, poorly stocked stands, and unstocked areas.

Sawlog volume.--The sawlog volume includes all merchantable softwood trees 9.0 inches and larger in diameter, breast height, estimated to a minimum top diameter inside bark of 6 inches, and hardwood trees 11.0 inches d.b.h. and larger, estimated to a minimum top d.i.b. of 8 inches. The volume of sawlog material in all stands amounts to 4,100,300,000 board feet, about 40 percent of which is in medium and heavy saw-timber stands containing at least 5,000 board feet per acre. Approximately 41 percent of it is in light saw-timber stands ranging from 1,500 to 5,000 board feet per acre. The remainder is scattered throughout the pole-timber stands or is in residual trees in poorly stocked or seedling and sapling stands.

The softwoods represent 77 percent of the sawlog volume. Approximately 56 percent of the volume of softwood saw timber and about 55 percent of the volume of hardwood saw timber is in trees less than 16 inches in

*4.1 billion bft for 1/2 of state vs Rappaport's
7.6 million*

diameter breast height. All sawlog volumes are net; that is, deductions have been made for rot, crook, or other defects. The average cull percent for all merchantable softwood saw-timber trees is about 5 percent; for hardwood saw-timber trees, 10 percent.

Volume in cords.--The total volume of material in all trees 5.0 inches d.b.h. and larger is 27,752,000 standard cords. About 43 percent of this is in pole-timber trees, 35 percent in material suitable for sawlogs, and the remainder in cull trees and the upper stems and limbs of saw-timber trees.

The total volume in cords is almost evenly divided between hardwood and softwood species. White pine accounts for nearly three-fourths of the softwood volume and the remainder is made up largely of hemlock, spruce, pitch pine, and fir. Red maple, red oak, sugar maple, and paper birch account for 69 percent of the hardwood volume and the remainder is largely yellow birch, beech, ash, and aspen.

Cubic-foot volume.--The total solid-wood content of all trees 5.0 inches d.b.h. and larger is 1,983,000,000 cubic feet. Only 22 percent of the softwood volume and 15 percent of the hardwood volume is in trees 17.0 inches d.b.h. and larger.

SOUTHERN NEW HAMPSHIRE

Table 1.--Commercial and noncommercial forest area by county group, 1948

Kind of land	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rocking- ham- Straf- ford	Total	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Percent</u>
Forest:						
Commercial	686,600	670,700	442,300	506,600	2,306,200	79.3
Noncommercial:						
Reserved productive	700	--	2,400	100	3,200	0.1
Nonproductive	3,800	3,600	6,900	1,500	15,800	0.6
Total	4,500	3,600	9,300	1,600	19,000	0.7
Total forest	691,100	674,300	451,600	508,200	2,325,200	80.0
Nonforest	161,400	128,300	118,000	175,300	583,000	20.0
All land ^{1/}	852,500	802,600	569,600	683,500	2,908,200	100.0

^{1/} From Areas of the United States, 1940, Bureau of the Census.

SOUTHERN NEW HAMPSHIRE

Table 2.--Forest and nonforest area by county, 1948

County	Forest		Nonforest		Total land area
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>
Belknap	207,900	81.0	48,700	19.0	256,600
Cheshire	393,300	85.7	65,600	14.3	458,900
Hillsborough	451,600	79.3	118,000	20.7	569,600
Merrimack	483,200	81.1	112,700	18.9	595,900
Rockingham	328,400	74.3	113,800	25.7	442,200
Strafford	179,800	74.5	61,500	25.5	241,300
Sullivan	281,000	81.8	62,700	18.2	343,700
Total	2,325,200	80.0	583,000	20.0	2,908,200

SOUTHERN NEW HAMPSHIRE

Table 3.--Commercial forest area by ownership class and county group, 1948

Ownership class	Belknap-Merrimack	Cheshire-Sullivan	Hills-borough	Rockingham-Strafford	Total	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Percent</u>
Federal:						
National forest	--	--	--	--	--	--
Other	4,300	900	--	--	5,200	0.2
Total Federal	4,300	900	--	--	5,200	0.2
State, county, and municipal	23,100	18,900	11,800	10,800	64,600	2.8
Private:						
Farm woodland ^{1/}	242,600	203,200	152,000	194,500	792,300	34.4
Other	416,600	447,700	278,500	301,300	1,444,100	62.6
Total private	659,200	650,900	430,500	495,800	2,236,400	97.0
All ownerships	686,600	670,700	442,300	506,600	2,306,200	100.0

^{1/} Census of Agriculture: 1945.

SOUTHERN NEW HAMPSHIRE

Table 4.--Commercial forest area by forest type and county group, 1948

Forest type	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rocking- ham- Strafford	Total	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Percent</u>
White pine:						
White pine	194,100	146,800	90,900	150,700	582,500	25.3
White pine-hardwood	99,800	13,100	87,000	93,900	293,800	12.7
Hemlock	45,900	73,300	15,100	20,200	154,500	6.7
Pitch pine	--	--	--	8,100	8,100	.3
Total	339,800	233,200	193,000	272,900	1,038,900	45.0
Spruce-fir:						
Spruce-fir	7,800	25,100	6,700	3,300	42,900	.9
Spruce-fir-hardwood	23,900	11,200	2,700	--	37,800	1.6
Cedar-tamarack-spruce	--	--	5,100	--	5,100	.2
Total	31,700	36,300	14,500	3,300	85,800	3.7
Aspen-paper birch:						
Aspen	30,000	--	74,300	14,000	118,300	5.1
Paper birch	28,800	26,000	7,900	--	62,700	2.7
Total	58,800	26,000	82,200	14,000	181,000	7.8
Hardwood:						
Northern hardwood	139,800	248,100	44,600	39,400	471,900	20.5
Hardwood-white pine	83,000	60,100	69,400	99,500	312,000	13.5
Hardwood-spruce-fir	15,000	43,900	3,400	--	62,300	2.7
Ash-maple-elm	--	10,900	11,700	52,500	75,100	3.3
Oak	18,500	12,200	23,500	25,000	79,200	3.5
Total	256,300	375,200	152,600	216,400	1,000,500	43.5
All types	686,600	670,700	442,300	506,600	2,306,200	100.0

Table 5.--Commercial forest area by county group, forest type group,
and stand-size class, 1948

BELKNAP-MERRIMACK COUNTIES

Stand-size class	Forest type group				All forest types
	White pine	Spruce-fir	Aspen-paper birch	Hardwood	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Saw-timber stands:					
Medium and heavy	74,600	12,700	--	4,200	91,500
Light	123,400	7,100	3,600	65,600	199,700
Pole-timber stands	65,000	4,300	12,200	109,700	191,200
Seedling and sapling	25,400	7,600	35,800	41,300	110,100
Poorly stocked stands	51,400	--	7,200	35,500	94,100
All stands	339,800	31,700	58,800	256,300	686,600
CHESHIRE-SULLIVAN COUNTIES					
Saw-timber stands:					
Medium and heavy	38,100	6,200	--	11,500	55,800
Light	58,700	20,800	3,700	66,700	149,900
Pole-timber stands	67,400	9,300	--	210,100	286,800
Seedling and sapling	--	--	15,600	57,000	72,600
Poorly stocked stands	69,000	--	6,700	29,900	105,600
All stands	233,200	36,300	26,000	375,200	670,700
HILLSBOROUGH COUNTY					
Saw-timber stands:					
Medium and heavy	19,700	--	--	3,600	23,300
Light	95,100	2,600	--	14,600	112,300
Pole-timber stands	39,800	11,900	16,200	86,200	154,100
Seedling and sapling	23,900	--	--	48,200	72,100
Poorly stocked stands	14,500	--	66,000	--	80,500
All stands	193,000	14,500	82,200	152,600	442,300
ROCKINGHAM-STRAFFORD COUNTIES					
Saw-timber stands:					
Medium and heavy	43,500	--	--	--	43,500
Light	60,300	3,300	--	30,100	93,700
Pole-timber stands	107,700	--	--	91,900	199,600
Seedling and sapling	38,000	--	14,000	29,900	81,900
Poorly stocked stands	23,400	--	--	64,500	87,900
All stands	272,900	3,300	14,000	216,400	506,600

SOUTHERN NEW HAMPSHIRE

Table 6.--Commercial forest area by forest type group and stand-size class, 1948

Stand-size class	Forest type group				All forest types
	White pine	Spruce-fir	Aspen-paper birch	Hardwood	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Saw-timber stands:					
Medium and heavy	175,900	18,900	--	19,300	214,100
Light	337,500	33,800	7,300	177,000	555,600
Pole-timber stands	279,900	25,500	28,400	497,900	831,700
Seedling and sapling	87,300	7,600	65,400	176,400	336,700
Poorly stocked stands	158,300	--	79,900	129,900	368,100
All stands	1,038,900	85,800	181,000	1,000,500	2,306,200

SOUTHERN NEW HAMPSHIRE

Table 7.--Commercial forest area by forest type group
and site class, 1948

Forest type group	Site class			All sites
	Good	Fair	Poor	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
White pine	4,100	886,600	148,200	1,038,900
Spruce-fir	--	67,000	18,800	85,800
Aspen-paper birch	--	87,600	93,400	181,000
Hardwood	12,500	825,400	162,600	1,000,500
All types	16,600	1,866,600	423,000	2,306,200
Percent	0.7	81.0	18.3	100.0

SOUTHERN NEW HAMPSHIRE

Table 8.--Commercial forest area by watersheds and stand-size class, 1948

Stand-size class	Watershed			Total	
	Connecticut	Merrimack	Saco ^{1/}		
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Percent</u>
Saw-timber stands:					
Medium and heavy	58,400	126,900	28,800	214,100	9.3
Light	36,000	353,600	66,000	555,600	24.1
Pole-timber stands	232,700	439,900	159,100	831,700	36.0
Seedling and sapling	52,400	220,300	64,000	336,700	14.6
Poorly stocked stands	92,000	199,900	76,200	368,100	16.0
All stands	571,500	1,340,600	394,100	2,306,200	100.0
Percent	24.8	58.1	17.1	100.0	--

^{1/} Minor coastal watersheds are included with the Saco for New Hampshire.

SOUTHERN NEW HAMPSHIRE

Table 9.--Net board-foot volume on commercial forest land by forest type group, stand-size class, and species group, 1948

(Log scale, International 1/4-inch rule)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.
Saw-timber stands:					
Medium and heavy					
Softwood	1,278,500	93,000	---	25,400	1,396,900
Hardwood	127,400	24,000	---	97,800	249,200
Total	1,405,900	117,000	---	123,200	1,646,100
Light					
Softwood	795,200	107,400	4,800	302,900	1,210,300
Hardwood	118,900	13,600	13,600	330,400	476,500
Total	914,100	121,000	18,400	633,300	1,686,800
Pole-timber stands					
Softwood	153,000	18,000	8,200	131,600	310,800
Hardwood	25,800	3,200	5,600	140,500	175,100
Total	178,800	21,200	13,800	272,100	485,900
Other stands ^{1/}					
Softwood	129,900	---	45,700	63,100	238,700
Hardwood	13,100	---	---	29,700	42,800
Total	143,000	---	45,700	92,800	281,500
All stands					
Softwood	2,356,600	218,400	58,700	523,000	3,156,700
Hardwood	285,200	40,800	19,200	598,400	943,600
Total	2,641,800	259,200	77,900	1,121,400	4,100,300
Percent	64.4	6.3	1.9	27.4	100.0

^{1/} Includes seedling and sapling stands, poorly stocked stands, and unstocked areas.

SOUTHERN NEW HAMPSHIRE

Table 10.--Average net board-foot volume per acre on commercial forest land
by forest type group, stand-size class, and species group, 1948

(Log scale, International 1/4-inch rule)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	Bd. ft.	Bd. ft.	Bd. ft.	Bd. ft.	Bd. ft.
Saw-timber stands:					
Medium and heavy					
Softwood	7,270	4,920	--	1,320	6,520
Hardwood	720	1,270	--	5,070	1,160
Total	7,990	6,190	--	6,390	7,680
Light					
Softwood	2,360	3,180	660	1,710	2,180
Hardwood	350	400	1,860	1,870	860
Total	2,710	3,580	2,520	3,580	3,040
Pole-timber stands					
Softwood	550	710	290	260	370
Hardwood	90	130	200	280	210
Total	640	840	490	540	580
Other stands					
Softwood	530	--	310	210	340
Hardwood	50	--	--	100	60
Total	580	--	310	310	400
All stands					
Softwood	2,270	2,550	320	520	1,370
Hardwood	270	480	110	600	410
Total	2,540	3,030	430	1,120	1,780

SOUTHERN NEW HAMPSHIRE

Table 11.--Net volume in cords of sawlog material on commercial forest land
by forest type group, stand-size class, and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	2,955	241	--	57	3,253
Hardwood	292	57	--	220	569
Total	3,247	298	--	277	3,822
Light					
Softwood	1,890	262	11	662	2,825
Hardwood	276	32	33	775	1,116
Total	2,166	294	44	1,437	3,941
Pole-timber stands					
Softwood	380	46	20	328	774
Hardwood	61	7	13	332	413
Total	441	53	33	660	1,187
Other stands					
Softwood	315	--	107	155	577
Hardwood	30	--	--	69	99
Total	345	--	107	224	676
All stands					
Softwood	5,540	549	138	1,202	7,429
Hardwood	659	96	46	1,396	2,197
Total	6,199	645	184	2,598	9,626
Percent	64.4	6.7	1.9	27.0	100.0

SOUTHERN NEW HAMPSHIRE

Table 12.--Average number of cords per acre of sawlog material on commercial forest land by forest type group, stand-size class, and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	16.8	12.8	--	3.0	15.2
Hardwood	1.7	3.0	--	11.4	2.7
Total	18.5	15.8	--	14.4	17.9
Light					
Softwood	5.6	7.8	1.5	3.7	5.1
Hardwood	0.8	0.9	4.5	4.4	2.0
Total	6.4	8.7	6.0	8.1	7.1
Pole-timber stands					
Softwood	1.4	1.8	0.7	0.7	0.9
Hardwood	0.2	0.3	0.5	0.7	0.5
Total	1.6	2.1	1.2	1.4	1.4
Other stands					
Softwood	1.3	--	0.7	0.5	0.8
Hardwood	0.1	--	--	0.2	0.1
Total	1.4	--	0.7	0.7	0.9
All stands					
Softwood	5.3	6.4	0.7	1.2	3.2
Hardwood	0.6	1.1	0.3	1.4	1.0
Total	5.9	7.5	1.0	2.6	4.2

SOUTHERN NEW HAMPSHIRE

Table 11.--Net volume in cords of sawlog material on commercial forest land
by forest type group, stand-size class, and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	2,955	241	--	57	3,253
Hardwood	292	57	--	220	569
Total	3,247	298	--	277	3,822
Light					
Softwood	1,890	262	11	662	2,825
Hardwood	276	32	33	775	1,116
Total	2,166	294	44	1,437	3,941
Pole-timber stands					
Softwood	380	46	20	328	774
Hardwood	61	7	13	332	413
Total	441	53	33	660	1,187
Other stands					
Softwood	315	--	107	155	577
Hardwood	30	--	--	69	99
Total	345	--	107	224	676
All stands					
Softwood	5,540	549	138	1,202	7,429
Hardwood	659	96	46	1,396	2,197
Total	6,199	645	184	2,598	9,626
Percent	64.4	6.7	1.9	27.0	100.0

SOUTHERN NEW HAMPSHIRE

Table 12.--Average number of cords per acre of sawlog material on commercial forest land by forest type group, stand-size class, and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	16.8	12.8	--	3.0	15.2
Hardwood	1.7	3.0	--	11.4	2.7
Total	18.5	15.8	--	14.4	17.9
Light					
Softwood	5.6	7.8	1.5	3.7	5.1
Hardwood	0.8	0.9	4.5	4.4	2.0
Total	6.4	8.7	6.0	8.1	7.1
Pole-timber stands					
Softwood	1.4	1.8	0.7	0.7	0.9
Hardwood	0.2	0.3	0.5	0.7	0.5
Total	1.6	2.1	1.2	1.4	1.4
Other stands					
Softwood	1.3	--	0.7	0.5	0.8
Hardwood	0.1	--	--	0.2	0.1
Total	1.4	--	0.7	0.7	0.9
All stands					
Softwood	5.3	6.4	0.7	1.2	3.2
Hardwood	0.6	1.1	0.3	1.4	1.0
Total	5.9	7.5	1.0	2.6	4.2

SOUTHERN NEW HAMPSHIRE

Table 13.--Net volume in cords of material other than sawlog on commercial forest land by forest type group, stand-size class, and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	922	129	--	14	1,065
Hardwood	743	65	--	218	1,026
Total	1,665	194	--	232	2,091
Light					
Softwood	1,566	249	1	222	2,038
Hardwood	1,172	206	101	1,999	3,478
Total	2,738	455	102	2,221	5,516
Pole-timber stands					
Softwood	1,257	233	33	624	2,147
Hardwood	1,048	152	348	4,485	6,033
Total	2,305	385	381	5,109	8,180
Other stands					
Softwood	912	--	44	177	1,133
Hardwood	282	--	297	627	1,206
Total	1,194	--	341	804	2,339
All stands					
Softwood	4,657	611	78	1,037	6,383
Hardwood	3,245	423	746	7,329	11,743
Total	7,902	1,034	824	8,366	18,126
Percent	43.6	5.7	4.5	46.2	100.0

SOUTHERN NEW HAMPSHIRE

Table 14.--Average number of cords per acre of material other than sawlog on
commercial forest land by forest type group, stand-size class,
and species group, 1948

(Standard cords, including bark)

Stand-size class and species group	Forest type group				All forest types
	White pine	Spruce- fir	Aspen- paper birch	Hardwood	
	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>
Saw-timber stands:					
Medium and heavy					
Softwood	5.2	6.8	--	0.7	4.9
Hardwood	4.2	3.4	--	11.3	4.8
Total	9.4	10.2	--	12.0	9.7
Light					
Softwood	4.6	7.4	0.1	1.2	3.7
Hardwood	3.5	6.1	13.8	11.3	6.2
Total	8.1	13.5	13.9	12.5	9.9
Pole-timber stands					
Softwood	4.5	9.1	1.2	1.2	2.6
Hardwood	3.7	5.9	12.2	9.0	7.2
Total	8.2	15.0	13.4	10.2	9.8
Other stands					
Softwood	3.7	--	0.3	0.6	1.6
Hardwood	1.1	--	2.0	2.0	1.7
Total	4.8	--	2.3	2.6	3.3
All stands					
Softwood	4.5	7.1	0.4	1.0	2.7
Hardwood	3.1	4.9	4.1	7.3	5.1
Total	7.6	12.0	4.5	8.3	7.8

SOUTHERN NEW HAMPSHIRE

Table 15.--Net board-foot volume on commercial forest land by species and stand-size class, 1948

(Log scale, International 1/4-inch rule)

Species	Saw-timber stands	Pole-timber stands	Other stands	Total	
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	Percent
Softwoods:					
Spruce	151,600	21,600	--	173,200	4.2
Fir	11,200	500	--	11,700	.3
Hemlock	632,900	79,700	71,200	783,800	19.1
White pine	1,798,400	199,100	163,500	2,161,000	52.7
Pitch pine	13,100	7,700	4,000	24,800	.6
Other softwoods	--	2,200	--	2,200	.1
All softwoods	2,607,200	310,800	238,700	3,156,700	77.0
Hardwoods:					
Sugar maple	170,500	17,900	2,200	190,600	4.7
Red maple	137,700	44,200	7,700	189,600	4.7
Red oak	145,100	33,700	14,000	192,800	4.7
Yellow birch	66,100	14,800	2,800	83,700	2.0
Paper birch	55,800	20,900	3,100	79,800	1.9
Beech	84,400	11,500	800	96,700	2.4
Ash	31,000	2,600	--	33,600	.8
Aspen	1,500	--	--	1,500	--
Other hardwoods	33,600	29,500	12,200	75,300	1.8
All hardwoods	725,700	175,100	42,800	943,600	23.0
All species	3,332,900	485,900	281,500	4,100,300	100.0
Percent	81.2	11.9	6.9	100.0	--

1/ Includes 29,300,000 board feet of red pine.

SOUTHERN NEW HAMPSHIRE

Table 16.--Net volume in cords of all trees on commercial forest land by species and stand-size class, 1948

(Standard cords, including bark)

Species	Saw- timber stands	Pole- timber stands	Other stands	Total	
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>Percent</u>
Softwoods:					
Spruce	845	364	2	1,211	4.4
Fir	98	24	1	123	.4
Hemlock	2,048	516	274	1/2,838	10.2
White pine	6,129	1,894	1,413	9,436	34.1
Pitch pine	60	65	20	145	.5
Other softwoods	1	58	--	59	.2
All softwoods	9,181	2,921	1,710	13,812	49.8
Hardwoods:					
Sugar maple	1,032	606	112	1,750	6.3
Red maple	1,588	2,080	302	3,970	14.3
Red oak	965	965	346	2,276	8.2
Yellow birch	633	620	52	1,305	4.7
Paper birch	608	821	214	1,643	5.9
Beech	591	251	44	886	3.2
Ash	189	193	31	413	1.5
Aspen	25	174	21	220	.8
Other hardwoods	558	736	183	2/1,477	5.3
All hardwoods	6,189	6,446	1,305	13,940	50.2
All species	15,370	9,367	3,015	27,752	100.0
Percent	55.4	33.8	10.8	100.0	--

1/ Includes 109,000 cords of red pine.

2/ Includes 348,000 cords of so-called noncommercial species such as: gray birch, pin cherry, hophornbeam, and serviceberry.

SOUTHERN NEW HAMPSHIRE

Table 17.--Net board-foot volume on commercial forest land by species and county group, 1948

(Log scale, International 1/4-inch rule)

Species	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rockingham- Strafford	Total
	<u>M bd.ft.</u>	<u>M bd.ft.</u>	<u>M bd.ft.</u>	<u>M bd.ft.</u>	<u>M bd.ft.</u>
Softwoods:					
Spruce	67,500	81,700	9,200	14,800	173,200
Fir	3,700	7,500	--	500	11,700
Hemlock	331,000	201,800	80,000	171,000	783,800
White pine	802,400	419,700	355,300	583,600	2,161,000
Pitch pine	2,800	1,600	2,000	18,400	24,800
Other softwoods	--	--	2,200	--	2,200
All softwoods	1,207,400	712,300	448,700	788,300	3,156,700
Hardwoods:					
Sugar maple	95,200	93,000	1,400	1,000	190,600
Red maple	48,600	64,700	14,100	62,200	189,600
Red oak	94,700	24,900	42,700	30,500	192,800
Yellow birch	28,500	33,000	4,600	17,600	83,700
Paper birch	39,500	30,200	5,200	4,900	79,800
Beech	50,800	43,900	800	1,200	96,700
Ash	13,900	15,900	1,000	2,800	33,600
Aspen	1,000	500	--	--	1,500
Other hardwoods	22,200	17,800	11,900	23,400	75,300
All hardwoods	394,400	323,900	81,700	143,600	943,600
All species	1,601,800	1,036,200	530,400	931,900	4,100,300
Percent	39.1	25.3	12.9	22.7	100.0

SOUTHERN NEW HAMPSHIRE

Table 18.--Net volume in cords of all trees on commercial forest land by species and county group, 1948

(Standard cords, including bark)

Species	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rockingham- Strafford	Total
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>cords</u>
Softwoods:					
Spruce	480	552	96	83	1,211
Fir	38	59	12	14	123
Hemlock	1,014	870	286	668	2,838
White pine	3,217	1,690	1,757	2,772	9,436
Pitch pine	8	8	15	114	145
Other softwoods	--	--	56	3	59
All softwoods	4,757	3,179	2,222	3,654	13,812
Hardwoods:					
Sugar maple	554	1,023	106	67	1,750
Red maple	1,026	1,502	593	849	3,970
Red oak	672	513	526	565	2,276
Yellow birch	265	671	178	191	1,305
Paper birch	715	465	289	174	1,643
Beech	333	434	33	86	886
Ash	105	205	78	25	413
Aspen	38	31	6	145	220
Other hardwoods	421	373	248	435	1,477
All hardwoods	4,129	5,217	2,057	2,537	13,940
All species	8,886	8,396	4,279	6,191	27,752
Percent	32.0	30.3	15.4	22.3	100.0

SOUTHERN NEW HAMPSHIRE

Table 19.--Net cubic-foot volume of all trees on commercial forest land by species, tree class, and kind of material, 1948

(Excluding bark)

Species	Saw-timber trees		Pole-timber trees	Cull trees	Total
	Sawlog material	Upper stems and limbs			
	M cu.ft.	M cu.ft.	M cu.ft.	M cu.ft.	M cu.ft.
Softwoods:					
Spruce	36,900	3,500	52,400	1,600	94,400
Fir	2,400	200	7,100	—	9,700
Hemlock	144,400	13,700	53,900	9,300	221,300
White pine	389,900	35,000	195,200	115,500	735,600
Pitch pine	4,900	700	4,200	1,500	11,300
Other softwoods	400	100	3,900	200	4,600
All softwoods	578,900	53,200	316,700	128,100	1,076,900
Hardwoods:					
Sugar maple	28,000	11,600	38,600	35,500	113,700
Red maple	28,900	12,700	163,200	53,300	258,100
Red oak	29,300	12,500	71,800	34,300	147,900
Yellow birch	12,900	5,400	47,800	18,800	84,900
Paper birch	12,500	5,300	81,400	7,600	106,800
Beech	14,500	6,500	26,400	10,200	57,600
Ash	5,000	2,200	15,300	4,300	26,800
Aspen	200	100	13,600	400	14,300
Other hardwoods	11,600	5,700	61,300	17,400	96,000
All hardwoods	142,900	62,000	519,400	181,800	906,100
All species	721,800	115,200	836,100	309,900	1,983,000
Percent	36.4	5.8	42.2	15.6	100.0

1/ Includes 8,500,000 cubic foot of red pine.

2/ Includes 22,600,000 cubic feet of so-called nonmerchantable species such as gray birch, pin cherry, hophornbeam, and serviceberry.

SOUTHERN NEW HAMPSHIRE

Table 20.--Net volume in cords of all trees on commercial forest land by species, tree class, and kind of material, 1948

(Standard cords, including bark)

Species	Saw-timber trees		Pole-timber trees	Cull trees	Total
	Sawlog material	Upper stems and limbs			
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>
Softwoods:					
Spruce	474	44	672	21	1,211
Fir	29	3	90	1	123
Hemlock	1,853	176	691	118	2,838
White pine	5,004	450	2,502	1,480	9,436
Pitch pine	63	8	54	20	145
Other softwoods	6	1	50	2	59
All softwoods	7,429	682	4,059	1,642	13,812
Hardwoods:					
Sugar maple	432	178	593	547	1,750
Red maple	444	195	2,512	819	3,970
Red oak	450	194	1,104	528	2,276
Yellow birch	197	83	736	289	1,305
Paper birch	192	81	1,257	118	1,643
Beech	222	99	407	158	886
Ash	77	34	236	66	413
Aspen	4	1	209	6	220
Other hardwoods	179	89	942	267	1,477
All hardwoods	2,197	954	7,991	2,798	13,940
All species	9,626	1,636	12,050	4,440	27,752
Percent	34.7	5.9	43.4	16.0	100.0

SOUTHERN NEW HAMPSHIRE

Table 21.--Net volume in cords of all trees on commercial forest land by
stand-size class, tree class, and kind of material, 1948

(Standard cords, including bark)

Stand-size class	Saw-timber trees		Pole- timber trees	Cull trees	Total
	Sawlog material	Upper stems and limbs			
	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>	<u>M cords</u>
Saw-timber stands:					
Medium and heavy	3,822	504	1,179	408	5,913
Light	3,941	718	3,690	1,108	9,457
Pole-timber stands	1,188	293	6,091	1,795	9,367
Other stands	675	121	1,090	1,129	3,015
All stands	9,626	1,636	12,050	4,440	27,752

SOUTHERN NEW HAMPSHIRE

Table 22.--Net board-foot volume on commercial forest land by species group,
diameter class, and county group, 1948

(Log scale, International 1/4-inch rule)

SOFTWOODS

Diameter class (Inches)	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rockingham- Strafford	Total	
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	Percent
10	161,500	146,200	90,600	191,500	589,800	18.7
12	195,800	172,900	112,600	170,700	652,000	20.7
14	185,100	131,000	60,900	161,300	538,300	17.0
16	188,200	79,800	61,500	116,400	445,900	14.1
18	140,200	81,400	65,100	71,500	358,200	11.3
20	120,900	47,600	32,500	36,700	237,700	7.5
22	43,300	20,000	19,800	7,500	90,600	2.9
24	13,800	17,800	--	11,200	42,800	1.4
26 and over	158,600	15,600	5,700	21,500	201,400	6.4
All softwoods	1,207,400	712,300	448,700	788,300	3,156,700	100.0
HARDWOODS						
12	102,100	117,300	34,000	45,000	298,400	31.6
14	64,200	91,600	17,900	45,700	219,400	23.3
16	42,200	43,300	17,800	35,400	138,700	14.7
18	40,600	36,000	4,700	12,500	93,800	9.9
20	25,900	26,000	4,200	3,000	59,100	6.3
22	11,200	--	--	--	11,200	1.2
24	14,000	5,900	3,100	2,000	25,000	2.6
26 and over	94,200	3,800	--	--	98,000	10.4
All hardwoods	394,400	323,900	81,700	143,600	943,600	100.0
All species	1,601,800	1,036,200	530,400	931,900	4,100,300	--

SOUTHERN NEW HAMPSHIRE

Table 23.--Net cubic-foot volume of all trees on commercial forest land by species group, diameter class, and county group, 1948

(Excluding bark)

SOFTWOODS

Diameter class (Inches)	Belknap- Merrimack	Cheshire- Sullivan	Hills- borough	Rockingham- Strafford	Total	
	M cu.ft.	M cu.ft.	M cu.ft.	M cu.ft.	M cu.ft.	Percent
6	29,900	35,300	33,600	44,600	143,400	13.3
8	52,900	44,100	35,700	48,700	181,400	16.8
10	40,400	39,300	25,100	51,400	156,200	14.5
12	43,000	38,400	25,100	38,000	144,500	13.4
14	39,700	29,700	13,400	38,500	121,300	11.3
16	37,000	16,500	12,200	22,500	88,200	8.2
18	26,700	16,300	13,100	14,200	70,300	6.5
20	26,300	9,500	6,100	8,800	50,700	4.7
22	10,200	5,600	4,100	2,700	22,600	2.1
24	3,000	5,200	3,800	3,900	15,900	1.5
26 and over	61,900	7,900	1,000	11,600	82,400	7.7
All softwoods	371,000	247,800	173,200	284,900	1,076,900	100.0
HARDWOODS						
6	62,700	59,800	34,400	44,800	201,700	22.3
8	68,800	77,100	31,700	39,600	217,200	24.0
10	39,600	57,900	25,100	28,100	150,700	16.6
12	23,900	38,700	10,900	15,100	88,600	9.8
14	16,300	31,800	8,300	12,700	69,100	7.6
16	10,700	18,200	4,600	11,200	44,700	4.9
18	10,100	16,900	1,800	3,400	32,200	3.6
20	6,900	9,000	5,700	5,700	27,300	3.0
22	2,700	3,300	700	800	7,500	0.8
24	3,900	8,500	1,400	2,000	15,800	1.7
26 and over	22,700	18,000	9,100	1,500	51,300	5.7
All hardwoods	268,300	339,200	133,700	164,900	906,100	100.0
All species	639,300	587,000	306,900	449,800	1,983,000	--

SOUTHERN NEW HAMPSHIRE

Table 24.--Species composition of each forest type group, expressed
in percent of net cubic-foot volume, 1948

Species	Forest type group			
	White pine	Spruce- fir	Aspen- paper birch	Hardwood
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Softwoods:				
Spruce	2.0	42.6	0.7	2.7
Fir	0.2	4.6	--	0.2
Hemlock	13.0	8.9	6.8	9.3
White pine	59.5	12.9	17.3	11.2
Pitch pine	1.0	0.2	--	0.1
Other softwoods	--	3.5	--	--
All softwoods	75.7	72.7	24.8	23.5
Hardwoods:				
Sugar maple	2.1	1.8	1.3	12.0
Red maple	8.3	15.4	9.2	19.8
Red oak	3.9	--	9.8	13.5
Yellow birch	1.8	3.6	1.8	8.1
Paper birch	3.2	4.0	41.4	5.4
Beech	0.8	0.4	1.0	6.5
Ash	0.6	1.2	2.0	2.4
Aspen	0.2	0.4	2.2	1.4
Other hardwoods	3.4	0.5	6.5	7.4
All hardwoods	24.3	27.3	75.2	76.5
All species	100.0	100.0	100.0	100.0

FOREST SURVEY PROCEDURE

These estimates of forest area and timber volume are based upon data obtained from a sampling of the seven counties. The following procedure was used:

Photo interpretation.--A large number of plots (about one to every 416 acres) were distributed regularly over the aerial photographs covering these counties. Photo interpreters first determined whether each plot was forest or nonforest. If forest, the stand in which the plot was located was examined by stereoscope and classified as to forest type and stand-size class (based on stand volume and density).

Ground-plot examination.--The next step was to examine on the ground enough 1/5-acre forest plots randomly selected from those previously examined on aerial photos in order to establish a reliable average volume per acre from a tally of trees by species and diameters at breast height. Estimates of cull, site quality, past use, and other items also were recorded from the ground plots. An average of about one ground plot was selected to every 4,370 acres of forest land.

Compilation of data.--Photo-interpretation and field-plot data were entered on punch cards. Tabulations were made from these data, resulting in the set of tables herewith.

ACCURACY OF DATA

The number of observations taken on the aerial photographs and the number of ground plots examined in each stand-size class were designed to yield forest area and volume estimates of the highest practicable degree of sampling accuracy for the personnel and equipment available. Some errors in the forest inventory are inescapable because: (1) area classifications may be imperfect and volume of sample trees is derived from measurements of diameter, height, and form, with adjustments for estimated defect; and (2) the estimated total is obtained by "blowing up" a sample.

Errors of the first class include mistakes in measurement and judgment, imperfect volume tables, and possible faulty adjustment for defects. Every effort was made to keep such errors to a minimum and compensating, but the degree to which this may have been attained cannot be measured satisfactorily. Errors of the second class are due to failure of the sample to perfectly represent the whole. Such errors are

measurable. The sampling errors for principal items for these counties as a whole are expressed below as percentages of their respective totals:

	<u>Percent</u>
Forest area	+ 0.9
Saw-timber area	+ 5.8
Pole-timber area	+ 7.5
Total board-foot volume	+ 6.1
Board-foot volume in saw-timber stands	+ 8.7
Total cubic-foot volume	+ 3.8
Cubic-foot volume in pole-timber stands	+ 8.5

If no bias and no systematic errors are assumed, it is reasonable to expect that actual areas and volumes will be within the indicated range of reported areas and volumes about two times in three, and within the range of two sampling errors about 19 times in 20. For example, the chances are about two out of three that the forest area would not differ more than 0.9 percent from that reported herein. The chances are about 19 in 20 that the forest area would not differ more than 1.8 percent or twice that for one sampling error. Corresponding statements may be made for each of the other items for which sampling errors are given.

Statistics of forest area by type, stand-size class, etc., reported in the tables herewith are subject to increasing sampling error as the class becomes finer and its numerical magnitude smaller. In general, experience to date indicates the ranges in area sampling error shown below:

<u>Class area in acres</u>	<u>Approximate area sampling error in percent</u>
Less than 50,000:	Variable, usually over 40
50,000 to 100,000:	Ordinarily between 20 and 40
100,000 to 300,000:	Usually between 10 and 20
More than 300,000:	Commonly less than 10, but may be as high as 20

Volume sampling errors are larger (in percentage) than area errors and have a tendency to vary by stand-size class. Sampling errors of board-foot data are usually larger than corresponding errors in cubic feet.

The percentage additions that should generally be made to area sampling errors in order to estimate volume sampling errors are shown below:

Stand-size class	Volume sampling errors in relation to area sampling errors	
	For board feet	For cubic feet
	<u>Percent</u>	<u>Percent</u>
Saw timber:		
Medium and heavy	Add 1	Add 1
Light	Add 2	Add 1
Pole timber	Add 6 to 10	Add 2 to 3

Board-foot and cubic-foot volumes per acre are extremely variable for seedling and sapling and poorly stocked stands. The volume sampling errors for these stand-size classes are erratic and may be from 25 to 100 percent higher than the area sampling errors.

EXPLANATION OF TERMS USED

AREA

Land area.--Includes dry land and land temporarily or partially covered by water, such as marsh land, swamps, and river flood plains, streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds having less than 40 acres of area. (See "Areas of the United States, 1940", U. S. Bureau of the Census, page 2). Does not include water areas larger than those defined above nor deeply indented embayments and sounds and other coastal water behind or sheltered by headlands or islands separated by less than 1 nautical mile of water; and islands having less than 40 acres of area.

Forest area.--Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use. Except for right of ways of active power lines, highways, roads, and railroads that are not abandoned, strips of nonforest land less than 100 feet wide and areas of less than 1 acre surrounded by forest were classified as forest.

Commercial forest area.--Forest land bearing or capable of bearing pole-timber or saw-timber stands of commercial character and economically available now or prospectively for commercial use and not formally withdrawn from such use.

Noncommercial forest area.--Two classes of forest land are included: (1) reserved productive--forest land bearing or capable of bearing pole-timber or saw-timber stands of commercial character but formally withdrawn from commercial use for parks, preserves, wilderness areas, and so forth; and (2) nonproductive--other forest land permanently incapable of producing commercial pole-timber or saw-timber stands. The latter areas are either rocky, mountainous, or do not possess the climate and soil qualities essential for the production of commercial timber crops.

Nonforest area.--All land areas other than forest, including the acreage in cultivation and pasture less than 30 percent covered by tree canopy; land enclosed within the right of ways of active power lines, highways, roads, and railroads; abandoned roads when the soil has been removed or the pavement remains; marshes, bare rock, quarries, coal strippings, and gravel pits; water areas such as lakes, reservoirs, and ponds having less than 40 acres of area, and streams, sloughs, estuaries, and canals less than one-eighth mile in width (larger water areas are classified as "inland waters" by the Bureau of the Census and are not included within land area figures); and urban and other residential and industrial areas. Narrow belts of trees such as fence rows and stream margins less than 100 feet in width and small groups of trees less than 1 acre in area that are surrounded by nonforest land are considered nonforest.

FOREST TYPE GROUPS

(Board-foot volume of each species in saw-timber stands and number of stems in other stand-size classes was the basis for forest type classification. Table 4 shows the detailed forest types that are combined in each forest type group. Table 24 gives the species composition of each forest type group, expressed in percent of net cubic-foot volume.)

White pine.--The principal types included are the white pine (white pine making up 75 percent or more of the stand) and white pine-hardwood (white pine comprising 50 to 74 percent of the stand). Relatively small areas of red pine have been included with the white pine types. Stands in which hemlock is pure or predominant and those in which pitch pine makes up 75 percent or more of the stand also are included in this type group.

Hardwood.--Hardwoods are predominant in the stands included in this type group. The northern hardwood type, made up largely of sugar maple, yellow birch, and beech, is the principal one in this type group. Next in importance is the hardwood-white pine type in which white pine

comprises 20 to 49 percent of the stand in association with oaks or northern hardwoods. The hardwood-spruce-fir, ash-maple-elm, and oak types also are included in this type group.

Aspen-paper birch.--Small pure stands of quaking and bigtooth aspen, or extensive areas of paper birch, or stands in which aspen and paper birch predominate in mixture with white pine, red maple, and red oak.

Spruce-fir.--Red spruce and balsam fir make up 75 percent of the spruce-fir stands and 50 to 74 percent of the spruce-fir-hardwood stands. A small area of the cedar-tamarack-spruce type is included.

STAND-SIZE CLASSES

(The minimum area classified according to stand-size was 1 acre.)

Medium and heavy saw-timber stands.--Stands that had a net volume of 5,000 board feet or more per acre.

Light saw-timber stands.--Stands that had a net volume of 1,500 to 4,999 board feet per acre.

Pole-timber stands.--Stands that had a net volume of less than 1,500 board feet per acre and at least 10 percent of the area covered by the crown canopy of pole-timber or larger trees. At least one-half the minimum stocking was in pole-timber trees. These stands generally contained at least 200 cubic feet per acre in trees 5.0 inches d.b.h. and larger.

Seedling and sapling stands.--Stands that did not qualify either as saw timber or pole timber but were well stocked with seedlings and saplings (at least 40 percent of the stand area covered by crown canopy). These stands generally contained at least 300 seedlings and saplings 1.0 to 4.9 inches d.b.h. per acre.

Poorly stocked stands.--Stands that did not qualify as saw timber or pole timber but were at least 10 percent stocked with saw-timber or pole-timber trees or with 10 to 39 percent of the crown canopy in seedlings and saplings.

Unstocked areas.--Stands that did not qualify as saw timber, pole timber, or seedling and sapling and were less than 10 percent stocked.

SITE CLASS

Site class.--Based on the average number of logs produced by mature trees in commercial forest areas. Where mature, dominant, or codominant trees were present, the following merchantable height classes, based on 16-foot logs were used:

Site	Hardwoods	Softwoods
Good	3 or more logs	5 or more logs
Fair	1½ to 3 logs	3 to 5 logs
Poor	8 feet to 1½ logs	8 feet to 3 logs
Nonproductive	(See definition under AREA)	

Where no mature trees of the dominant or codominant crown classes were present, site was estimated from the species and growth of immature trees, the depth and type of soil, aspect, soil moisture, and the shrubby and herbaceous ground cover. Poor sites that are incapable of producing pole-timber or saw-timber stands were classed as nonproductive (noncommercial forest area).

VOLUME ESTIMATES

(Volume in trees on areas classified as nonforest is not included; all volumes are net, that is, with defect deducted.)

Board-foot volumes.--Includes the sawlog material in saw-timber trees estimated through use of the International 1/4-inch log rule, which closely approximates green lumber tally for square-edged boards. Top diameters vary with the limits of usable sawlog material. Deductions have been made for rot, crook, and other defects.

Cubic-foot volume.--Includes the sound wood, excluding bark, in: (1) the sawlog portion of saw-timber trees, (2) the upper stems of softwood saw-timber trees and the upper stems and limbs of hardwood saw-timber trees to a minimum of 4 inches inside bark, (3) the full stems of pole-timber trees to a minimum of 4 inches inside bark, and (4) the sound wood volume of cull trees. No deductions were made for defects unless they affected the wood structure.

Volume in cords.--This volume was derived from the net cubic-foot volume (excluding bark) by applying a factor of 78 cubic feet per cord for softwoods and 65 cubic feet per cord for hardwoods. Although the number of cubic feet per cord varies with size of material, those converting factors were used for all material in this report. The resulting figures approximate the volume of a standard stacked cord (4 feet by 4 feet by 8 feet), including bark. No deductions were made for defect unless they affected the wood structure.

TREE CLASSES

Saw-timber tree.--A softwood tree at least 9.0 inches d.b.h. (diameter outside bark at $4\frac{1}{2}$ feet above the ground on the upper side of the tree) or a hardwood tree at least 11.0 inches d.b.h. with a sound log at least 8 feet long and with at least half of the gross volume of the tree in merchantable material.

Pole-timber tree.--A tree that ranged from 5.0 inches d.b.h. up to the minimum saw-timber tree size and that gave promise of becoming a merchantable saw-timber tree.

Cull tree.--A tree that did not qualify as a saw-timber or pole-timber tree because of poor form, limbiness, rot, or other defect.

Tree-diameter class --Each 2-inch diameter class includes all trees measured in the range from 1.0 inch below the midpoint of the class up to but not including 1.0 inch above the midpoint. For example, the 6-inch class includes all trees whose d.b.h. fall in the range of 5.0 inches up to but not including 7.0 inches.

SPECIES

The various tree species found in this area are listed below. Approved common names^{1/} are shown in parentheses if these differ from the brief name used in the tables. Approved scientific names^{1/} are underlined. If two or more species are included under a single name in the tables, the various species are listed or the word "species" appears after the approved scientific name for the genus.

Softwoods

Spruce (Red spruce)	- <u>Picea rubens</u>
(Black spruce)	- <u>Picea mariana</u>
Fir (Balsam fir)	- <u>Abies balsamea</u>
Hemlock (Eastern hemlock)	- <u>Tsuga canadensis</u>

^{1/} U. S. Forest Service. Check list of the native and naturalized trees of the United States, including Alaska. U. S. Dept. Agr. 325 pp. 1944.

Softwoods (continued)

White pine (Eastern white pine) ^{2/}	- <u>Pinus strobus</u>
Pitch pine	- <u>Pinus rigida</u>
Other softwoods (Jack pine)	- <u>Pinus banksiana</u>
(Cedar, Northern white-cedar)	- <u>Thuja occidentalis</u>
(Cedar, Southern white-cedar)	- <u>Chamaecyparis thyoides</u>
(Tamarack)	- <u>Larix laricina</u>

Hardwoods

Sugar maple	- <u>Acer saccharophorum</u>
Red maple	- <u>Acer rubrum</u>
Red oak (Northern red oak)	- <u>Quercus borealis</u>
Yellow birch	- <u>Betula lutea</u>
Paper birch	- <u>Betula papyrifera</u>
Beech (American beech)	- <u>Fagus grandifolia</u>
Ash	- <u>Fraxinus species</u>
Aspen (Bigtooth aspen)	- <u>Populus grandidentata</u>
(Quaking aspen)	- <u>Populus tremuloides</u>
Other hardwoods (White oak)	- <u>Quercus alba</u>
(American bass-wood)	- <u>Tilia americana</u>
(Hickory)	- <u>Carya species</u>
(American elm)	- <u>Ulmus americana</u>
(Black willow)	- <u>Salix nigra</u>
(Downy service-berry)	- <u>Amelanchier arborea</u>
(Gray birch)	- <u>Betula populifolia</u>
(Eastern hop-hornbeam)	- <u>Ostrya virginiana</u>
(Pin cherry)	- <u>Prunus pennsylvanica</u>
(Sycamore)	- <u>Platanus occidentalis</u>

^{2/} Red pine (Pinus resinosa) has been included under white pine.



TERRITORY SERVED
by the
**NORTHEASTERN FOREST
EXPERIMENT STATION**



UPPER DARBY, PA.